

**REMARKS**

This communication is responsive to the outstanding Office Action. As regards the restriction requirement, Applicant hereby confirms the election of the claims of Group I, claims 1 to 16, with traverse. The Examiner contends that the apparatus as claimed could be used to practice another and materially different process, such as flushing coil pipes of a heat exchanger. However, a pipe cleaning or flushing process using the apparatus of claim 17 would not be materially different from the process as claimed in claim 1, regardless of the type of pipe to which the apparatus is connected. Claim 17 defines a pipe renovating system in which a supply of pressurized gas and a supply of abrasive particles are connected to a mixing machine and the outlet of the mixing machine is connected to a hose for connection to a port of a pipe system, and a vacuum pump is connected to a hose for connection to a second port of the pipe system. Use of this system would inherently result in the process as claimed in claim 1, regardless of whether the hoses were connected to the ends of heat exchanger pipe or to pipes in other types of plumbing systems. It is therefore submitted that the election requirement is incorrect, and reconsideration and reversal of this requirement is respectfully requested.

On page 7 of the Office Action, the Examiner has rejected claims 1 to 4 and 9 to 15 as obvious in view of Reimelt and McCune. This rejection is hereby traversed, and it is submitted that the invention as claimed in amended claim 1 is neither taught nor suggested by the combined teachings of these references.

The Examiner contends that Reimelt "fails to teach the second flow rate at the second port (outlet) being faster than the input flow rate". The difference between Reimelt and the invention as claimed in claim 1 is not merely a failure to teach a higher flow rate at the outlet than the inlet. Reimelt does not even suggest a combination of applying pressurized gas at a first port while simultaneously applying vacuum or suction at a second port, let alone a difference between the flow rates applied at the two ports. Instead, Reimelt's method applies suction at one end of the pipe only in order to draw abrasive particles into and through the pipe. In column 2, lines 39 to 62, Reimelt first describes the disadvantages of blowing compressed air through the pipe, due to the fact

that this may cause damage or blockages in the pipe. He then goes on to state that "the method of the invention does not require additional instrumentation as it proposes that the suction process be carried out from one end of the pipe only..... An additional particular advantage is that the method in accordance with the invention can largely be carried out from one end of the pipe, i.e. the side with suction." (see column 2, lines 50 to 58). As regards the metering of the coating material into the pipe, Reimelt states that "this can be done prior to the suction process so that still only one single operator is required to start and execute the coating procedure." (column 2, lines 59 to 62). Reimelt clearly teaches away from having a supply of compressed air connected to one port of a pipe system while simultaneously applying suction at another port, and does not suggest having different flow rates at the two ports.

McCune teaches cleaning a pipeline by blowing compressed air and abrasive particles into one end of the pipe, with no devices applied at the other end of the pipe. McCune is therefore the reverse of Reimelt. In other words, McCune supplies pressurized gas at an inlet end only, while Reimelt applies suction at an exit end only. There is no suggestion in either reference of simultaneously applying pressurized gas at one end while applying suction at the other end. Reimelt teaches away from any such combination, since he describes the problem of connecting a compressor to a pipe as well as the advantage of carrying out the renovation at one end only of the pipe (col. 2, lines 39 to 62).

When two references are combined in making an obviousness rejection, three basic criteria must be met (see MPEP 2143). First, there must be some suggestion or motivation in the references themselves or in knowledge generally available to one of ordinary skill in the art to combine the references. There is clearly no motivation suggested by these references for combining them as the Examiner has proposed, and in fact such a modification of Reimelt would be contrary to the clearly stated objectives of this reference, i.e. avoiding potential damage occurring as a result of blowing compressed air into a pipe, avoiding the requirement for complex instrumentation at both the inlet and the outlet end, and avoiding the need to have an operator at each open end of the pipe. All of these objectives would be lost if Reimelt were to be modified

to provide a compressed air supply at the inlet end of the pipe section to be cleaned.

The second requirement for establishing obviousness is that there must be a reasonable expectation of success, which is also lacking in this case. Finally, the prior art references must teach or suggest all claim limitations. As regards amended claim 1, neither Reimelt nor McCune teaches or suggests supplying compressed air to one port of a piping system while simultaneously applying suction at a second port, let alone such a combination where the vacuum flow rate is higher than the inlet flow rate. The Examiner contends that McCune teaches increasing the efficiency of the process by increasing the outlet velocities. However, in McCune's case, the outlet velocity is not increased by increasing the flow rate setting of a vacuum pump or the like at the outlet port, but by increasing the inlet pressure or flow rate (see column 6, lines 54 to 59). McCune discusses increasing the efficiency of cleaning by increasing the outlet velocity, but again this is achieved by an increase in the inlet pressure (column 8, lines 24 to 25). The calculations in this part of McCune's patent are simply to show that variations in inlet pressure can change the outlet velocity significantly. There is no suggestion of supplying pressurized gas at a first port at a first flow rate while simultaneously applying suction at a second port at a second, higher flow rate.

The Examiner contends that it would have been within the level of the skilled artisan to increase the velocity in the piping and it was known that this would increase cleaning effectiveness. In prior art such as McCune, the velocity is increased by increasing the pressure or flow rate of compressed gas applied at an inlet port. In Reimelt, velocity would be increased by increasing the suction at the exit port. Neither of these references, or the prior art as a whole, suggest the concept of increasing velocity by supplying pressurized gas at one port while simultaneously applying suction at a second port, as described in this application in paragraph 0010, pages 3 to 4, and elsewhere. This push and pull method has the additional advantage of transporting material through the pipe quickly and evenly.

It is submitted that the method as claimed in amended claim 1, in which pressurized air is supplied to a first port at a first flow rate, mixed with abrasive material,

while simultaneously applying suction at a second port at a second, higher flow rate, is not suggested by the combined teachings of the references. It is further submitted that amended claim 1 is not obvious in view of these references, and reconsideration and reversal of the rejection of this claim is respectfully requested.

Claims 2 to 4 and 9 to 15 depend from amended claim 1 and are distinguished from Reimelt and McCune for the same reasons as claim 1, and additionally since these claims define other features which are not suggested by these references. Referring to claims 2 and 3, the references do not even suggest a pressurized gas input flow rate at one port which is less than a vacuum or suction flow rate at a second port, let alone the specific flow rate ratio ranges of claim 2, or the ratio of claim 3 which has been found by the Applicant to produce optimum results. In rejecting claims 2 and 3, the Examiner refers to col. 2, lines 53 to 57, col. 6, lines 1 to 17, and column 8, lines 15 to 31 of McCune. Column 2, lines 53 to 57 of McCune describes only desired inlet velocities for a sand blasting step (see col. 2, lines 46 to 48), and describes supplying a mixture of gas and sand at an inlet "at a pressure and volumetric flow rate sufficient to provide a minimum inlet velocity of not less than 2000 feet per minute to clean pipelines...". McCune goes on to recommend a desired inlet velocity of not less than 3000 feet per minute, and a desired inlet velocity of 5000 to 6000 feet per minute for different pipe diameters. The teaching here is not of providing a ratio between an inlet flow rate of pressurized gas and an outlet suction flow rate, but only of providing a sufficient inlet pressure and flow rate in order to achieve the desired velocity. The ratios of claims 2 and 3 are neither taught nor suggested by McCune.

Lines 1 to 17 of column 6 are similarly only concerned with providing a suitable inlet velocity of the mixture in order to clean a line, and teaches increasing that velocity with increased pipe diameter. Lines 15 to 31 of column 8 of McCune is describing an equation which relates inlet velocity and pressure with outlet velocity and pressure, and discusses how the inlet velocity and pressure must be increased in order to increase the outlet velocity of the gas and abrasive particle mixture. There is no suggestion of connecting a vacuum pump at the outlet or of making the suction flow rate of the pump greater than the inlet flow rate of pressurized gas. McCune is merely describing how the

outlet velocity of a gas mixture at an outlet to which no suction is applied is raised by increasing the inlet velocity. It is therefore submitted that claims 2 and 3 are also not obvious in view of Reimelt and McCune.

As regards claim 4, the Examiner contends that the step of determining when the inner surface of a pipe has been sufficiently cleaned and then applying a coating to the surface is taught in the abstract of Reimelt. However, the abstract refers only to drawing abrasive agents through the pipe and then coating the inner surface with a metered quantity of coating material. There is no suggestion of any step of determining when the inner surface of the pipe is sufficiently cleaned. Claim 9 depends from claim 4, and also defines a step of applying a second layer of coating material. In rejecting claim 9, the Examiner refers to column 4, line 18 of Reimelt. This is not understood, since column 4, lines 18 to 21 refers to the use of resin or synthetic resin or plastic as a coating material, not to applying a second layer of coating material. Claim 9 is also not obvious since the feature of this claim is totally lacking from both references.

Referring to claims 10 and 11, although Reimelt does use heated air to dry and heat the pipe, he draws the heated air through the pipe using a vacuum pump, and does not pump the air in at one end while applying suction at the second end.

Claim 15 also describes method steps which are completely lacking from the references. The Examiner acknowledges that Reimelt "fails to teach disconnecting the piping and cleaning a second pipe section", but contends that this would have been well within the level of the skilled artisan. However, the proper test for obviousness is not whether or not a claimed invention is within the capabilities of one of ordinary skill in the art, but whether or not there is any motivation suggested by the references for modifying them to achieve the claimed invention (see MPEP 2143.01), whether there is any reasonable expectation of success, and whether the references teach or suggest all claim limitations. The motivation to combine the references or modify a reference must both be found in the prior art, and not in the applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). In this case, there is no teaching or motivation in the references or the prior art as a whole to modify Reimelt as proposed

by the Examiner, and no suggestion in any reference of the technique of claim 15 for cleaning successive pipe sections by simply moving a compressor from port to port while a vacuum pump is connected to an additional port.

In the present invention, as claimed in claim 15, it is not simply a case of disconnecting the entire system and reconnecting it in order to clean a new pipe section. Instead, as indicated in Figure 6 and described in paragraphs 0030, 0031, and 0032 on pages 11 and 12 of this application, the vacuum pump 15 stays connected to the **same** port, while the compressor 12 is moved from one port to another (i.e. from 80 to 82 and then 84. At the same time, the ratio between the first and second flow rates is adjusted each time the compressor is connected to a new port. The steering produced by the combination of pressurized gas supplied to the first port and vacuum or suction applied at the second port will ensure that the desired section of pipe is cleaned. This avoids the need to cap off other ports or supply air to these ports to prevent back flow, and makes the entire pipe cleaning process much faster and more efficient. Such a method is neither described nor suggested in any way by the references cited by the Examiner.

It is therefore submitted that claims 1 to 4 and 9 to 15 are not obvious in view of Reimelt and McCune, and reconsideration and reversal of the rejection of these claims is respectfully requested.

The Examiner has rejected claim 5 in view of Reimelt and McCune when further combined with Naf. This rejection is hereby traversed. Claim 5 depends from amended claim 1 and claim 4, and the features of these claims lacking from the first two references, as discussed above, are similarly lacking from Naf. Even if epoxy resin were used as a coating material in Reimelt, the invention as claimed in claim 1 and claim 5 would still not be achieved. Claim 5 is therefore also not obvious, and reconsideration and reversal of the rejection of this claim is respectfully requested.

In paragraph 9 of the Office Action, the Examiner rejects claims 6 to 8 and 16 as obvious in view of Reimelt, McCune, and Yamamoto. This rejection is also hereby traversed, and it is submitted that these claims, as well as the claims from which they

depend, are fully distinguished from the cited references.

Claim 6 depends from amended claim 1 and claim 4. The features of amended claim 1 and claim 4 lacking from the first two references, as discussed above, are similarly lacking from Yamamoto. The features claimed in claim 6 are also lacking from Yamamoto. In Yamamoto, an air compressor 1 is used to pump a foamed sealant material into one end of a pipe. There is no suggestion in Yamamoto or any other reference of pumping the gas and liquid coating material into a first port at a first flow rate while applying suction at a second port at a second flow rate higher than the first flow rate so as to steer the gas and coating material in a predetermined direction from the first port to the second port. Claim 6 is therefore not obvious, and reconsideration and reversal of the rejection of this claim in paragraph 9 is respectfully requested.

Claims 7 and 8 depend from claim 6 and are distinguished from the references for the same reasons as claim 6, and additionally since these claims define other features lacking from the references. As regards claim 7, the Examiner refers to column 4, line 21 of Reimelt. This states that the pressure difference necessary to draw in the coating material is provided by the vacuum generated at the outlet. As has been noted above, Reimelt is concerned with avoiding the problems of introducing compressed air into the pipe, and instead uses suction at one end of the pipe only (column 2, lines 52 to 53) to draw air and particles into the pipe. Reimelt states "only the viscous coating material must be introduced into the pipe at the other open end; this can be done prior to the suction process so that still only one single operator is required to start and execute the coating procedure." (see column 2, lines 58 to 62). Reimelt does not teach, for either the pipe cleaning or pipe coating procedures, the connection of a compressor at a first port for supplying gas at a first flow rate combined with the connection of a vacuum generator at a second port for simultaneously applying suction at a higher flow rate. It is therefore submitted that claim 7 is not obvious in view of the references, and reconsideration and reversal of the rejection of this claim is respectfully requested.

Claim 16 depends from claim 15, and is distinguished from the references for the same reasons as stated above in connection with claim 15. The features of claim 15

lacking from Reimelt and McCune are similarly lacking from Yamamoto. The Examiner rejects claim 16, like claim 15, on the basis that the method as claimed in claim 16 “would have been well within the level of the skilled artisan”, since Reimelt teaches cleaning a variety of different piping. This is not a proper test of obviousness. The test for obviousness is not whether it would have been possible to modify the prior art to achieve the claimed invention. Instead, in order for obviousness to be established, there must be some suggestion or motivation for combining the reference teachings, there must be a reasonable expectation of success, and the prior art references must teach or suggest all claim limitations. None of these criteria are met by the references cited against claim 16.

Claims 15 and 16 are concerned with a method of cleaning and coating successive different sections of the same piping system. The fact that Reimelt discusses different types of pipes is not relevant here, since these claims do not discuss cleaning a first type of pipe in a first piping system and then a completely different type of pipe in a second piping system. Instead, the actual limitations of the claims must be considered and compared with the cited references. As is the case with claim 15, none of the references cited against claim 16 either describes or suggests a method of coating an entire pipe system in which a mixture of gas and liquid coating material is supplied to a first port of the pipe system at a first flow rate while applying suction to a second port at a second flow rate higher than the first rate so as to coat a first pipe section, after which the supply of gas and liquid coating material is disconnected from the first port and connected to a third port while applying suction to the second port, and the procedure is then repeated by connecting the gas and liquid coating material supply to successive different ports in the system until the entire piping system has been coated. Reimelt is silent as to treatment of a pipe system with numerous ports and branches, and instead describes renovating a pipe with at least two ends. McCune and Yamamoto also only describe cleaning and/or coating of a single length of pipe. Merely disconnecting these pipe renovating systems from the pipes to which they are connected, and then connecting them to different pipes, is not the same as the method described in claim 15 or 16. In the method of these claims, one element of the pipe renovating system, specifically the vacuum generator or pump, remains connected to



the same port while the other elements (compressor, abrasive particle supply or coating supply) are successively connected to different ports in the system (as schematically illustrated in Figure 6). There is no teaching or suggestion of such a method in any of the cited references, and it is submitted that claim 16 is not obvious in view of these references.

Reconsideration and reversal of the rejections of claims 6 to 8 and 16 is therefore respectfully requested.

It is submitted that the foregoing amendment and argument deals with all grounds of objection and rejection. It is believed that claims 1 to 16 are now in condition for allowance, and early notice to this effect is earnestly solicited. Reconsideration and reversal of the restriction requirement, and consideration and allowance of claims 17 to 24 is also respectfully requested. If there are any outstanding grounds of objection and rejection which could be dealt with by means of a telephone interview, the Examiner is encouraged to contact the undersigned representative at the telephone number below.

Respectfully submitted,

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By: Katherine Proctor  
Katherine Proctor  
Agent for Applicant  
Registration No. 31,468

GORDON & REES LLP  
101 West Broadway, Suite 1600  
San Diego, CA 92101  
Telephone: (619) 696-6700  
Facsimile: (619) 696-7124

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